

Upper Cliff Dwelling Architecture

Masonry

Masonry of the Tonto cliff dwellings is rather poor. The buildings were constructed of native rock laid with adobe mortar; the rock is quartzite from the cliff. This falls in blocks which can be easily used for masonry with no shaping necessary. The faces of the rock are seldom parallel, however, and the resultant walls, one rock in width, lack stability.

The walls were built in sections. Construction was carried up about 2 feet, plaster applied, and the wall allowed to set before the next section was added. Horizontal lines which limit these units are clearly discernible on the walls. A feature of every complete wall is a parapet which was built around the roof. The parapets vary in height from 1 to 3 feet.

Doors

Nearly all the doors of the Upper Ruin were originally built in a rectangular or square shape, and subsequently altered to a half-T, or to a narrower rectangular opening. In two instances more than one alteration was made. Treads of the doors were fashioned of stone slabs. The lintels varied; stone slabs, poles, pine planks, and a plank with poles, were all used.

Steps below doorways were built in two rooms. In Room 4, a masonry step was built below the door from Room 3 to break the distance, 2.5 feet, between floor and door tread. The floor of Room 12 is 4 feet below the floor of Room 17, and the door which connects the two was built at the top of the wall. Fifteen inches below the tread of the door a short slab of rock projected from the wall to serve as a step. The first step up was a crotch splitter but there is no evidence of another step, unless there was a block of stone on the floor of Room 12 which might have been used as a step. This step has, since 1940, been broken.

Loopholes

Loopholes are of common occurrence in the walls of the Upper Ruin. They are small, usually 6 or 7 inches square, and are sometimes lined with small spalls of rock, while others are only plastered with adobe. The loopholes were built from 2 to 4 feet above the floors of the rooms and, with few exceptions, several were made in a single wall, each bearing on a different angle of approach to the site. Many of these are in walls which are no longer exterior walls of the site, but there is no example of one of these holes having been filled in with earth or masonry.

Roof Construction

In the smaller rooms juniper or pinyon poles 3 or 4 inches in diameter were placed across them as vigas. The poles were laid with 8 or 9 inch centers, and alternate butts were reversed. In the larger rooms a thick juniper post, butt end up, was set in the floor to support a large sycamore viga which in turn supported vigas of juniper or pinyon. Material used above the vigas varied. Juniper shakes, saguaro ribs, carrizo (*Phragmites*), willow withes, and agave and sotol flower stalks all were used, occasionally two or three of these in the same roof. Clumps of bunch grass, roots and all, were sometimes laid between the supporting material and the layer of adobe above.

During excavation of Room 9 several large adobe chunks of a peculiar shape were found in the debris caused by the fall of the first-story roof. When all the pieces were found, and fitted together, they formed a heavy ring whose interior surface showed markings such as would be caused by applying wet plaster to a wooden post. The juniper post which had served as roof support for the second-story roof was then examined and the ring found to fit the base of the post. The ring was an ingenious device for bracing the base of the second-story roof support.

Floors

All floors of the Upper Ruin are of adobe and of irregular surface; no flagstones were used. In each room several layers of adobe plaster had been applied to the floor. No floor features other than firepits were found. The firepits are bowl-shaped and average 8 inches deep with a diameter of 12 to 15 inches. The rims are very slightly raised above the floor.

Lower Cliff Dwelling Architecture

Masonry

The masonry of both the Lower Ruin and the Annex is of adobe clay and native stone. Adobe clay was used for both mortar and plaster. The mortar was applied profusely and the rocks were set in it with no special attempt at fine rockwork, and the whole was completely plastered over with a thick layer of mud. In effect it almost appears as though the stone was used only to take up space so that a little less mud would be needed. The stone is unshaped quartzite, which occurs conveniently and in great quantity on the talus slope below the ruin. The adobe is a creamy tan in color and full of small stones, which inhibited the making of very smooth plaster. This was overcome in some places by "floating". The adobe was obtained probably from the talus slope, as there are places where a fair grade of it can be secured with a slight amount of work in removing the larger rocks.

Walls were laid up in courses 18 to 24 inches high. The first course was rounded at the top so that the next course would give a better bond. After the first course was dry the next was laid, and so on.

No foundations were used. Walls rested either on bed rock or loose fill, and even there reached considerable height. The tallest wall still standing in the Lower Ruin is 15 feet 7 inches, and rests on loose fill. Standing walls of the Annex are all much shorter, the highest being only about 6 feet 5 inches. Walls taper slightly from bottom to top and average 12 inches thick, with plaster averaging 2 inches thick. From the number of handprints still visible, plastering was done by hand. Interior rooms have their plaster smudged from smoke.

In addition to the lack of wall foundations on soft fill the builders also made the mistake of not bonding new walls to old. This is ideal for the archeologist wishing to determine building sequence, but is a definite structural weakness. Such weakness would not have affected the building too much while occupied and with ceilings kept in good condition, but once the ceilings were gone the walls were more apt to fall.

Openings

There are 10 doorways still evident in the Lower Ruin. In the Annex there are none, probably because walls which would normally contain doors, if any, have fallen. Of the 10 in the Lower Ruin 8 are rectangular and 2 are half-T shaped. All at one time had been rectangular but 2 were made T-shaped by filling in with blocks of masonry. It is also possible that many of the rectangular doorways had been made T-shaped in this same way but that the masonry blocks were pushed out in later years. Four of these 10 doorways are sealed.

Average size of the rectangular doors is 2 feet wide and 3 feet high. The T-shaped doors are usually about the same size except that the bottom of the door is only about a foot wide. The narrow portion of a T-door extends up about 1 foot and then it widens to full width. Bases of some of the doors are raised about 10 inches above floor level.

Door lintels were of several types. Three consisted of three to four poles 2 to 3 inches in diameter. One was made of six saguaro cactus ribs. Three were of rough-hewn sycamore or juniper planks averaging 3 inches thick, 7 to 12 inches wide, 4 to 5 feet long and buried 16 to 18

inches in the walls. One lintel was a slab of stone 1¼ inches thick, 1 foot wide and 3 feet 4 inches long. Another lintel was hidden by the sealing job so that its material could not be determined.

Access from one story to the other was probably by ladder through hatchways. A hatchway in the southeast corner of Room 14 was lined with stone to keep the adobe floor from breaking off. It measured 3 feet long by 1 foot 6 inches wide.

Two holes, each about 6 inches square, in second story walls, point to the front of the cave. One looks down at a 45 degree angle on the section containing Rooms 17, 18, and 19 and could be a loophole. The other is in the wall between Rooms 7 and 15.

Floors

Floors were made of hard-packed adobe clay, in places 4 to 5 inches thick, and in many rooms was used in conjunction with smooth bedrock to offer a very smooth surface. The adobe in this case was used to fill rough spots in the native rock, and most room floors of the Annex were made in this manner.

Where there was only loose fill to build on the Indians seemingly had trouble keeping their floors from wearing out. Most of these had been patched and replastered several times. In patching holes they used old sandals, bits of cloth, and hanks of yucca fiber. Quite often old floor was covered with trash or yucca fiber before a new clay coat was applied.

Clay floors sloped slightly upward at wall junctions to produce rounded angles. Pothunters, ground squirrels, and visitors have ruined many floors so that most of those remaining are rough and uneven, but the few which are fairly complete show a remarkably smooth, almost polished surface.

Roofs

There is one complete roof in Room 14, one partially complete in Room 10, and evidence of several others in the Lower Ruin, as well as evidence of second story roofs. In the Annex no evidence of roof structure was found. Several rooms used the natural cave roof.

Roofs had been made with one main bearing beam, about 7 to 8 inches in diameter, across one center axis of the room. The middle of the beam rested in the notched end of a vertical log buried a foot or so in the floor. The main beam was either buried in the walls or one end rested on a cave ledge with mud plastered around it. Small poles of sycamore and juniper, at right angles to the main beam, and about 8 to 10 inches apart, ran almost the whole width of the room, but in most cases were only long enough for one end to rest on the main beam and the other in the wall.

On top of the poles and at right angles to them was a layer of saguaro ribs (the skeleton or woody structure of the saguaro cactus, *Cereus giganteus*). The ribs were covered with 4 to 5 inches of adobe clay forming floor for the room above. Occasionally a layer of grass or reeds was laid over the saguaro ribs to help insure that no mud would fall into the room below.

This made a heavy and very thick roof and one that was fairly fireproof. Ceiling thickness was 8 to 12 inches. Ceiling height of the rooms from floor to bottom of the secondary poles averaged about 6 feet 2 inches. Rooms with bedrock ceilings were much lower, some as low as 3 feet 6 inches.

Fireplaces

Most rooms had fireplaces. A firepit was found usually either near the center of a room or in one corner near the cliff wall. There were three types. The most common was clay lined. They were about 12 to 16 inches in diameter and 5 to 10 inches deep, made by excavating a circular hole in the fill and plastering the sides with a layer of adobe. Usually the lip of the pit was raised an inch or so above the floor.

One firepit, similar in size to the clay-lined ones, was made of small stone slabs set in adobe. Firepits of the third type were in depressions in the bedrock. These were simply small natural hollows in which fires had been built.